ON GPS- NAVIGATION

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On GPS- navigation STARIKOV V. N., Isachenkov F.N. Michurinsk State Teachers Training Institute It is classic problem (the different-distance-method) for determination of unknown Cartesian object-coordinates x,y,z in known instant t of earthly objects using known Cartesian 4 or 5 satellite-coordinates $x_{i},y_{i},z_{i}, i=1,2,3$ in the same time t or their measured object-distances $r_{i}=((x_{i}-x)^{2}+(y_{i}-y)^{2}+(z_{i}-z)^{2})^{1/2}, i=1,2,3,4,5 $. Problem reduced to solved system of 3-equations in 3 unknowns: $AX=b, X=(x,y,z)^{T}$ - unknowns-vector, b - known constants-vector, A - $3x3$- matrix of known coefficients depending on x_{i},y_{i},z_{i} or $r_{i}, i=1,2,3,4$ for $dr=0$. Here $dr=c dt$ is unknown constant for object-distance-measurement-error to satellites r_{i}. This error dtdepend on time-nonsynchronization dt of object-clock and satellites.clock, c is light-velocity in vacuum. Problem reduced to solved system of 4-equations in 4 unknowns: $AX=b, X=(x,y,z,dr)^{T}$ - unknowns-vector, b - known constants-vector, A - $4x4$- matrix of known coefficients depending on x_{i},y_{i},z_{i} or $r_{i}, i=1,2,3,4,5$ for $dr>0$. It is proved theorem. This theorem consequence consist on that it need 4-5 coplanar satellites sometimes or 2 and more crossing-orbits-satellites in order to measure r_{i} - distances to object for neighbouring instants: $t, t+dt, t+2dt$. Formulae are coded as in Tex ($LaTex$ or $AMS-Tex$).